

Remarks:

The above amendments and these remarks are responsive to the non-final Office action dated June 7, 2006.

Prior to entry of the present Amendment, claims 4, 6-9, 11, 12, 14, 15, 19, 21-24, 26, 29, 31-39 remained pending in the present application. These claims were rejected under 35 U.S.C. § 102(e) based on Carcia et al. (US2004/0127038) and variously under 35 U.S.C. § 103(a) based on Carcia et al. (US2004/0127038) in view of Taylor (U.S. 4,521,698), Hong et al. (U.S. 6,674,495), Krivokapic (U.S. 6,100,558), and/or Hornik et al. (US2004/0169210). Applicants respectfully traverse these rejections.

In a previous Amendment, claims 1-3, 5, 10, 13, 16-18, 20, 25, 27, 28, 30, 40-43, 45-47 and 49 were cancelled. With the present Amendment, applicants submit new claims 50-67, which reintroduce the subject matter of claims that have been cancelled. In addition, applicants amend claims 14, 29, and 38 to restore these claims to dependent form. These claims now depend from claims 55, 61, and 60, respectively. Moreover, applicants amend claims 6-9, 11-12, 21-24, 26, and 31-37 to revert these claims to depend from the newly added claim corresponding to the previously cancelled claim from which these claims originally depended.

In view of the amendments above, and the remarks below, applicants respectfully request reconsideration of the application under 37 C.F.R. § 1.111 and allowance of the pending claims.

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Rejection of claims 4, 19, and 48

Claims 4 and 48 stand rejected under 35 U.S.C. § 102(e) based on Carcia et al. Claim 19 stands rejected under 35 U.S.C. § 103(a) based on Carcia et al. in view of Taylor. These claims recite, in part, a semiconductor device, a three-port semiconductor device, and a display comprising a plurality of display elements that each include a semiconductor device having a channel, or a means for providing a channel, "of a ternary compound containing zinc, tin, and oxygen... having the following stoichiometry: Zn_2SnO_4 ."

In the Office action dated March 20, 2006, the Examiner noted that claims 4, 19, and 48 were allowable over the prior art of record if they were rewritten in independent form. Applicants, in a response dated May 17, 2006, amended these claims to include all of the features of the base claim and any intervening claims. In the present Office action, the Examiner has asserted that Carcia et al. teaches the channel, or the means for providing a channel, of these claims. Applicants respectfully disagree.

Carcia et al. relates to transparent oxide semiconductor thin film transistors. Specifically, Carcia teaches thin film transistors that employ ZnO or In_2O_3 compounds disposed between conducting source and drain electrodes. In the Office action, the Examiner refers to a passage from Carcia et al., in which it is disclosed that "the transparent oxide semiconductor (TOS) is selected from the group consisting of zinc oxide (ZnO), indium oxide (In_2O_3), tin oxide (SnO_2), or cadmium oxide (CdO) semiconductor and combinations thereof." (Carcia et al., paragraph 0010) The Examiner further asserts that the Zn_2SnO_4 stoichiometry recited by claims 4, 19, and 48

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is anticipated by this passage from Carcia et al., as "one of said 'combinations' especially the combination $2\text{ZnO} + \text{SnO}_2 \rightarrow \text{Zn}_2\text{SnO}_4$)."

In discussing the transparent oxide semiconductor for a thin film transistor, Carcia et al. discloses four binary oxides, and indicates the potential for combination thereof, which combinations may include ternary, quaternary, and quinary compounds. Carcia et al. is insufficient to anticipate the recited Zn_2SnO_4 combination, and would not be sufficient disclosure for one of ordinary skill to immediately envisage the specific ternary zinc-tin oxide combination.

There are an infinite number of stoichiometric combinations of the four binary oxides disclosed by Carcia et al. The large number of ternary oxides makes clear that one of ordinary skill would not immediately envisage the Zn_2SnO_4 combination recited in claims 4, 19, and 48 from the general statement of Carcia et al. Accordingly, the broad characterization of possible combinations of binary oxides on Carcia et al. does not render the claimed compound obvious. Since Carcia et al. fails to disclose every element of these claims, applicants submit that claims 4, 19, and 48 are allowable for at least these reasons, and request the withdrawal of the rejection of these claims under 35 U.S.C. § 102(e) and under 35 U.S.C. § 103(a).

New claims 50, 56, 60, and 64, and their dependents

New claims 50, 56, 60, and 64 recite the subject matter of claims 1, 16, 25, and 45, which were cancelled previously. Claims 50, 56, and 64 recite, in part, a semiconductor device, a three-port semiconductor device, and a display comprising a plurality of display elements that each include a semiconductor device having a

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channel, or a means for providing a channel, "of a ternary compound containing zinc, tin, and oxygen." New claims 51-55 depend variously from claim 50. Claims 6-9, 11-12, and 14 have been amended to depend various from claim 50, as they, in their original form, variously depended from claim 1. Claim 15 depends from claim 14, which has been amended to depend from claim 55.

New claims 57-59 depend variously from claim 56. Claims 21-22 have been amended to depend from claim 57, which depends from claim 56, as they depended previously from claim 17. Claims 23-24 have been amended to depend from claim 56, as they depended previously from claim 16.

New claims 65-67 depend variously from claim 64.

Claim 60 recites, in part, a thin film transistor including "a channel layer formed from a zinc-tin-oxide material." Claims 61-63 depend variously from claim 60. Claims 29 and 31-34 have been amended to depend from claim 61, as they depended previously from claim 26. Claims 26 and 35-38 have been amended to depend from claim 60, as they depended previously from claim 25. Claim 39 depends from claim 38.

Claims 50-67 have been added to restore the subject matter of previously cancelled claims, and claims 6-9, 11-12, 14, 21-24, 26, 29, and 31-38 have been amended in light of the Examiner's new grounds of rejection of claims 4, 19, and 48 in order to place the application in proper form for appeal. These claims, in their previous form, have been rejected under various grounds under 35 U.S.C. § 102(e) over Cillessen et al. (U.S. 5,744,864) and under 35 U.S.C. § 103(a) over Cillessen et al. in combination with one or both of Minami et al. (Japanese Journal of Applied Physics,

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Vol. 23, pp. L 1693-1696 (1994)) and Ando et al. (US 6,184,946). In an amendment filed on January 5, 2006, applicants traversed these rejections. The rejections were reasserted in a final Office action dated March 20, 2006. In order to further prosecution of then-allowable dependent claims to allowance, applicants cancelled the prior claims without prejudice and amended claims 6-9, 11-12, 14-15, 21-24, and 31-39 to depend variously from then-allowable claims. However, as has been noted above, the Examiner has rejected claims 4, 19, and 48 as being anticipated and/or rendered obvious by Carcia et al. Applicants submit that claims 50, 56, 60, and 64, as well as the several claims that depend from these new independent claims are not anticipated and/or rendered obvious by Carcia et al.

Specifically, as discussed previously, Carcia et al. discloses four binary oxides, including ZnO and SnO₂, and suggests their combinations, which applicants suggest may include ternary, quaternary, and quinary oxides. Although Carcia et al. does indicate that combinations of these four binary oxides may be used, such indication is insufficient to anticipate the recited ternary compound containing zinc, tin, and oxygen, or a zinc-tin oxide material, and would not be sufficient disclosure for one of ordinary skill to immediately envisage the a ternary zinc-tin oxide combination.

There are an infinite number of stoichiometric combinations of the four binary oxides disclosed by Carcia et al. The large number of ternary oxides makes clear that one of ordinary skill would not immediately envisage the ternary zinc-tin oxide combination recited in claims 50, 56, 60, and 64 from the general statement of Carcia et al. Accordingly, the broad characterization of possible combinations of binary oxides on

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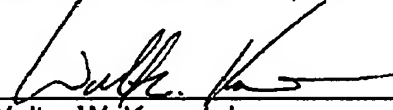
Carcia et al. does not render the claimed compound obvious. Since Carcia et al. fails to disclose every element of these claims, applicants submit that claims 50, 56, 60, and 64 are allowable for at least these reasons, and for the reasons presented in the January 5, 2006 response, and request the allowance of these claims.

Conclusion

Applicants believe that this application is now in condition for allowance, in view of the above amendments and remarks. Accordingly, applicants respectfully request that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney of record.

Respectfully submitted,

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to Examiner J. Mondt, Group Art Unit 3663, Assistant Commissioner for Patents, at facsimile number (571) 273-8300 on September 7, 2006.


 Christie A. Doolittle

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